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CONTENTS.

	PAGE.
A Case of Anthrax Septicæmia in a Human Being associated with Acute Anthrax Endocarditis and Peritonitis. By George Blumer, M. D.,	127
A Study of Subcutaneous Fibroid Nodules. By T. B. Futcher, M. B.,	133
Cases of Amœbic Dysentery. By Cunningham Wilson, M. D.,	142
Proceedings of Societies:	
The Hospital Medical Society,	143
Hyperpyrexia in Typhoid Fever [Dr. Osler];—Abscess of the Liver, perforating the Lung [Dr. Osler];—Pyarthrosis [Dr. Finney];—Specimen of Stomach removed after Francke's Operation for Gastrostomy [Dr. Finney];—Schede's Operation for Varicose Veins of the Leg [Dr. Finney].	
Notes on New Books,	146
Books Received,	146

A CASE OF ANTHRAX SEPTICÆMIA IN A HUMAN BEING ASSOCIATED WITH ACUTE ANTHRAX ENDOCARDITIS AND PERITONITIS.

By George Blumer, M. D., *Assistant in Pathology*, and Hugh H. Young, M. D.

(*From the Pathological Laboratory of the Johns Hopkins University and Hospital.*)

The following case of the œdematous form of anthrax seems worthy of being recorded, on account of the rarity of this form of the disease in this country, and also because of certain other interesting features of the case, namely, acute peritonitis and endocarditis due to the bacillus anthracis. The case has already been briefly referred to by Dr. Flexner in the Johns Hopkins Hospital Bulletin for May-June, 1895.

C. B., aged 59, a native of Germany, and a laborer in a hair factory, came to the Johns Hopkins Hospital Dispensary on Saturday, May 11, 1895, complaining of the swelling of the lids of the right eye. His history was as follows:

Family History. His father and one brother died of some lung trouble, the exact nature of which he does not know; one brother died of cancer of the liver. The family history is otherwise negative.

Past History. He had the usual exanthems as a child. Denies venereal history, and gives no history of secondary lues. Drinks one glass of beer daily. Does not use tobacco. Had typhoid as a young man, but since that time has always been strong and healthy. He has worked in a hair factory for thirteen years.

Present History. Two days ago, while working with South American hair, he scratched his right eye with his hand, as it was itching. The next morning he noticed that the eyelids were slightly swollen, and itchy, and by this morning they were so swollen that he came to the dispensary.

At the time of the visit the swelling was confined to the lids of the right eye, and was fairly sharply localized; it was œdematous in character, and quite boggy, the overlying skin appearing almost of a natural color. Two small incisions were made, one into each lid, and a small quantity of rather thin, whitish fluid, resembling diluted milk, was evacuated. Cultures upon agar-agar were made at this time, and two days later the tube inoculated showed a pure growth of an organism which resembled the bacillus anthracis, and which upon inoculation killed a mouse in 24 hours. Further tests proved it to be the anthrax bacillus.

The patient was admitted to the hospital on May 13, four days from the onset of the disease. The physician who attended him at his home, from Saturday until his admission on Monday, stated that his temperature had been subnormal during the entire period. On admission the patient com-

plained of nothing but slight pain beneath the right side of the jaw; otherwise he felt perfectly comfortable. He had no headache or malaise. His mind was perfectly clear. The following note was made at this time:

Patient is in bed on his back. Temperature F. 102°. Pulse 132 per minute, regular, volume fair, tension not increased. Respirations 16 per minute, easy. Tongue has a slight white coat. The mucous membranes are of a fair color, not cyanosed.

Both eyes are closed by œdema. On the left side the swelling is not nearly so marked as on the right, the lids being distended by a moderately firm, watery œdema.

The lids of the right eye are much swollen, hard, and tense, and the overlying skin is occupied by several vesicles, varying in size from a pea to a bean, and filled with clear, yellowish serum.

The eyes themselves appear uninvolved.

Over the whole of the right side of the face and neck, and extending up onto the scalp, is a marked œdema of varying consistency; immediately around the right eye it is very hard, and covered by tense shiny skin; over the forehead, neck and remainder of the face, as well as over the implicated scalp, it is much less firm and can be easily pitted by pressure.

The œdema extends across to the left side of the forehead, and occupies the neck as low down as the clavicle. On the inside of the mouth, the right cheek is marked with the imprints of the teeth, and has a yellow-gray sloughy appearance.

The thorax is rather barrel-shaped, but expands well and equally.

The lungs are hyper-resonant throughout on percussion; on auscultation the breath-sounds are clear, but expiration is prolonged.

The point of maximum cardiac impulse is neither visible nor palpable. The heart-sounds are best heard in the fifth intercostal space 3 cm. within the mammillary line. The sounds are rather distant, but apparently clear. The area of relative cardiac dullness is almost obliterated by lung tympany.

The border of the liver is indistinctly felt just below the costal margin.

The spleen cannot be palpated.

The abdomen is natural in appearance, but is universally tender to the touch.

The shins are clean. There is no œdema.

The glands on the right side of the neck are moderately enlarged, and tender. Their consistency cannot well be made out, on account of the overlying œdema.

The glands elsewhere are not enlarged.

May 14, 10 a. m. The patient is much worse this morning. He has had several involuntary passages of urine and fæces during the night. The mind is quite clear, and he answers questions rationally. He complains a good deal of cramp-like pains in the abdomen. The pains are situated in the umbilical region, and are sharp and constant, with occasional acute exacerbations, during which he has a desire to defecate. The abdomen is extremely sensitive to pressure this morning. The spleen cannot be palpated. The pulse at the wrist is almost imperceptible and practically uncountable.

The heart-sounds are extremely distant and feeble.

The temperature has been subnormal since 4 a. m. this morning and is now F. 97°.

The right eye is somewhat more swollen than it was yesterday, and the œdema now occupies the whole of the scalp, and has spread down the right side of the chest to the level of the pectoral fold; it also occupies all the tissues overlying the upper part of the sternum.

The patient gradually sank, and died quietly at 4 p. m. on the 14th.

Before death the œdema had spread further over the left cheek, and had also extended somewhat further down the chest. The patient became very cyanotic before death. There was no respiratory distress at any time. His mind was perfectly clear to within fifteen minutes of his death.

On the morning of the 24th he had three loose watery stools, of a grayish color, and apparently containing no blood.

The urine was passed involuntarily and could not be xamined.

Autopsy, May 15th, 18 hours after death, the body in the meanwhile having been preserved on ice. Body 174 cm. long, moderately well nourished, strongly built. Rigor mortis in both extremities. The right eyelids are œdematous, closing the eye; they are congested and glazed, and the epidermis is peeling off. The whole right side of the face, below the eye, is œdematous, and the œdema extends over the head and neck. The left eye and left side of the face are less swollen. The œdema is well marked anteriorly over the neck and clavicles, and can be followed well down on the chest. On incising the skin, above the clavicles, much clear serum-like fluid escapes. The œdema extends beyond the median line to the left, and is immediately evident after incision, extending to the sternum. Subcutaneous fat is moderate in amount.

Peritoneum. The peritoneal cavity contains turbid fluid; at least 2000 cc. of such fluid is present in the cavity. The serosa is injected, its reflection lost, the vessels very hyperaemic. Smaller and larger ecchymoses are seen beneath the serous membrane. In the smaller omentum, in the region of the pancreas, a large ecchymosis is seen.

In several situations along the small intestine the serosa is very hyperæmic, or even hemorrhagic, over areas as large as a silver quarter, and at these places the walls of the intestine are bulged outwards. The tissues about the kidneys and pancreas are translucent in appearance and very œdematous.

Mediastinum. On removing the sternum the mediastinal tissues are swollen, œdematous, and contain gas bubbles. The œdema of the mediastinal tissues can be traced downwards from the neck, passing in with the cellular tissue below the clavicle. Large gas bubbles or spaces occupy this tissue.

Lungs. Both lungs lie free in the pleural cavities. They are both emphysematous, particularly in the upper lobes, and along the anterior borders, which almost meet in the middle line of the body, anteriorly.

The heart is nearly covered by lung.

On incision the two lungs present similar appearances. They are œdematous and very hyperæmic, the œdema and

hyperæmia being particularly noticeable in the lower lobes. There is no actual consolidation.

Pericardium and *heart*. On incising the pericardium there is an escape of gas. No excess of fluid in the pericardial cavity. Both layers smooth and pale.

The heart is not enlarged; its cavities appear normal. The valves show no chronic change; the auriculo-ventricular orifices not perceptibly abnormal. Along the free edge of the mitral valve, and less along the aortic segment, are several small elevations, appearing to be quite recent vegetations, covered by small red clots. The aorta is quite smooth. The heart's flesh friable and pale.

Liver. The capsule is free from adhesions. Surface smooth. On section, dark in color, quite cloudy; consistency perhaps diminished.

Spleen. Free from adhesions; well up under the costal margin; moderately large; only moderately soft; red in color; pulp abundant.

Kidneys. Both alike. Capsule strips off easily. The organs are swollen, the surface almost uniformly congested, the congestion being still evident on section. Striæ are coarse. Glomeruli visible and red. Ureters normal.

Adrenals and *pancreas* appear normal.

Stomach. In the pyloric region there is in the mucous membrane a large, deeply congested area, measuring 8x6 cm. in extent. It is not clear that there is a false membrane over it, but some grayish-yellow material adheres to the surface.

Intestines. The duodenum is congested uniformly. Beginning in the jejunum, which is less congested, there occur at intervals small, elevated, deeply congested, or hemorrhagic foci. These are quite circumscribed, although the mucous membrane about them is congested. They average 2 mm. in width and project 1 mm. above the surface of the intestine; they do not seem to correspond with the lymphatic follicles. The serosa over them is often the deeply congested, bulged-out portion already described; this is, however, not exclusively the case. These foci are quite numerous in the jejunum, at least 15 being present in this part of the gut alone. At times, two or three were close together, though, as a rule, they were more separated. In the ileum they were also seen, in this situation perhaps a little more separated, but in all as many were present as in the jejunum. In connection with one of these areas in the ileum, what appeared to be a false membrane occurred. If a membrane, it was thin, and easily scraped away. Several of the nodules showed superficial ulceration. There was no relation detected to the lymphatic apparatus, and the nodes were less numerous near the ileo-cæcal valve. The large intestine shows no such localized foci, only a diffuse congestion.

Mesenteric glands were swollen, congested, hemorrhagic, and softened.

Brain and *cord* not examined.

Bladder contained a small amount of turbid urine; the mucous membrane appears normal.

Bacteriological Examination.

Cultures were made, at the time of the first visit to the dispensary, from the incision made into the upper lid. Cover-slips and cultures were made during life, from the serous fluid from one of the vesicles over the right eye, and also from the blood.

The cover-slips from both the vesicle and the blood showed large bacilli, occurring usually in chains, and morphologically resembling the bacillus anthracis.

The cultures taken on the first visit, and also those from the vesicles and blood, all showed large numbers of gray-white colonies.

Transplantations were made from these colonies, upon agar-agar, gelatine, bouillon, potato, and litmus milk, the resulting growths resembling in every particular the growth of bacillus anthracis; and cover-slips showing large bacilli similar to those obtained from the vesicle and blood.

A mouse inoculated subcutaneously with an oese of the original culture died 24 hours later with local œdema and swollen spleen, and the organism was found in abundance in its heart's blood and other organs. At the time of the autopsy cover-slips were made from the peritoneal fluid, heart's blood, œdematous fluid in the neck, spleen, kidneys and lungs. Typical anthrax bacilli were present in all these preparations, in the peritoneal fluid associated with pus cells.

Cultures from the heart's blood, spleen, peritoneum, liver, kidney and lung, all showed a pure culture of the bacillus anthracis.

Cover-slips and cultures from the urine were negative. At the time of the autopsy three mice were inoculated subcutaneously:

1. With one oese of blood from the heart.
2. With 2 oeses of urine (the surface of the bladder having first been sterilized).
3. With a small piece of tissue scraped from one of the intestinal nodules.

All three animals died within a short time of one another, about 24 hours later. Autopsies showed local œdema and swelling of the spleen, and cover-slips from the site of inoculation, and from the spleen, showed typical anthrax bacilli.

Histological Examination.

Sections were made from the heart valve (including one of the fresh vegetations), from the lung, liver, kidney, spleen, stomach and intestine.

Heart valve. The valve itself appears to be normal, with the exception of an adherent triangular mass attached to one surface of it. This mass represents one of the small fresh vegetations. It is attached by its base, its apex lying free, the principal points of attachment being at the two angles. At its point of attachment the vegetation consists almost entirely of fibrin; the body of the mass contains, beside fibrin, granular material, red blood corpuscles, many polynuclear leucocytes, and a few cells of an epithelioid type. The polynuclears and epithelioid cells are not equally distributed throughout the mass, but in certain places form closely packed aggregations of cells.

The valve itself appears to be free from anthrax bacilli, these being limited to the vegetation. Here they are extremely numerous, much more so than in the blood, and are distributed throughout the mass, being perhaps a little more

numerous in the cellular masses described above than elsewhere. The bacilli occur at times singly, but are generally in groups or long chains.

Lung. The lungs show a moderate degree of chronic interstitial pneumonia, with compensatory emphysema, and some congestion.

The anthrax bacilli are more numerous here than in any other organ; they occur in the blood-vessels of the alveolar walls in large numbers. None are to be seen in the alveoli themselves.

Liver. The liver shows some thickening of the capsule and a well marked interlobular cirrhosis. In places there is a marked increase in bile pigment in the cells. A few localized areas of extensive fatty degeneration, with fragmentation of nuclei are seen scattered through the organ.

The bacilli are not very numerous in the liver; when seen, they are in small groups between the cells, evidently in the blood-vessels.

Kidney. The surface of the kidney is covered by a slight exudate very similar to that obtained from the peritoneum. It consists mainly of red blood cells, but a few poly- and mononuclear elements are also present.

The organ shows here and there thinning and adhesion of the capsule with localized connective tissue formation. A few fibroid glomeruli are seen. The kidney cells are well preserved, as a rule, but in places, especially in the convoluted tubules, are swollen and granular.

The anthrax bacilli are present in moderate numbers; a few are seen in the exudate on the surface, and they are scattered throughout the organ, being most numerous in the glomerular vessels.

Spleen. The chief change in the spleen seems to lie in the accumulation of blood within its tissues; the amount of blood is very large, and is evidently largely responsible for the swelling of the organ. The number of polynuclear leucocytes in the organ is very evidently increased.

The bacilli are found throughout the organ, most abundantly in the Malpighian corpuscles; they appear to lie in the blood spaces.

Stomach. The changes here are rather sharply localized in the area situated in the pylorus, the gross appearance of which has been described. There is some slight necrosis of the outer layers of the mucosa all through the section, and a much more marked necrosis in the region of the local lesion.

The lesion consists in a sharply localized infiltration of the mucosa with anthrax bacilli. The bacilli forming this mass evidently originally came by means of the blood current, as deep in the mucosa two blood-vessels are seen, both of which show distinct breaks of continuity, with hemorrhage into the surrounding tissue. The mass of bacteria stretches continuously from these vessels, through the mucosa, to the mucous surface of the stomach, and consists of myriads of closely interwoven bacilli. The mass is not of even width from the surface to the depths, but spreads out widely in two places, one immediately beneath the mucous surface, and the other midway between the surface and the muscularis mucosa, thus forming two spreading masses connected with each other and with the ruptured vessels by comparatively thin pedicles of bacteria.

The mucous membrane surrounding this mass is very necrotic, though there is but little reaction, only a few polynuclears being seen about the focus.

Intestines. In the diseased areas, described macroscopically, the intestinal wall is much thickened.

The surface epithelium in these areas is almost entirely destroyed, and in many instances the villi have also disappeared, their bases remaining on the level of the openings of the follicles of Lieberkühn. The denuded surface thus left is ragged, but is practically free from exudate of any description. The villi which remain show two distinct processes. A certain number of them show a markedly more cellular connective tissue than normal, the increase in cells being of the lymphoid variety, and perhaps being only apparent, as the tissue is much compressed from the dilatation of the central vessels.

Certain others of the villi show a necrotic appearance, their cellular elements being greatly reduced in number, the nuclei of the cells which remain staining poorly, and the mass of the affected villus having a hyaline appearance and staining sharply with the eosin. This necrotic process on the surface of the intestine is not confined to the mucosa immediately over the diseased foci, but is found on the surface of the intestine elsewhere.

The muscularis mucosa is seen as an indistinct line, the indistinctness being due to its infiltration by cells, most of them polynuclear leucocytes, which spread apart its fibres, and render its distinction from the submucosa difficult.

In places it is pushed up towards the mucous surface, by the much dilated blood-vessels of the submucosa; in places it is pushed down towards the submucosa by the dilated vessels in the mucous coat.

In the submucous coat the most marked changes are seen, these changes being responsible for most of the increase in thickness of the intestinal wall.

The blood-vessels are intensely dilated and full of blood, in which it is easy to see that an excess of polynuclear leucocytes exists. In places there has been actual rupture of the vessel-wall, with extravasation of blood into the surrounding tissues.

Surrounding the blood-vessels, and filling up the entire area between the muscularis mucosæ and the internal muscular coat, is a dense cellular mass, thickest at the centre of the diseased area, and gradually shading off at the periphery into approximately normal tissue. The return to normal is more rapid towards the peritoneal than towards the mucous surface.

The mass consists almost exclusively of leucocytes with polyform nuclei, as a rule, densely packed, but, in places, separated by masses of granular or fibrillar fibrin.

Towards the mucous surface of the intestine the cellular infiltration practically stops at the muscularis mucosa, this structure containing only a moderate number of leucocytes, and but a very few being found in the mucosa.

Passing towards the serous surface of the intestine, we find that the polynuclears have passed between the fibres of the

circular muscular coat, in places spreading these fibres widely apart by their accumulation, and have penetrated into and through the longitudinal coat, appearing in large numbers on the serous surface of the intestine.

The longitudinal coat contains, in places, large numbers of the pus cells.

Here and there, throughout the cellular mass in the submucous coat, are small areas of necrosis with nuclear fragmentation.

The cell infiltration in the submucous coat is, as a rule, diffuse, but in places it appears as small circumscribed nodules.

These nodules, under the low power, strongly resemble the normal lymphoid follicles of the intestine, the resemblance being made more striking by their situation in the submucous coat, and pushing up to, though not into the mucous coat. Under the high power, however, they are found to be made up of polynuclear leucocytes.

The nodules then are small, round or oval areas of cells situated about in the normal position of the lymphoid follicles, but having no relation whatever to these follicles, as their structure proves, and being in fact focal inflammatory lesions.

The collections of ganglion cells, both in the submucous coat, and between this coat and the internal muscular layer, are widely separated by the wandering in of polynuclear leucocytes between the cells.

The lymphatic vessels just beneath the muscularis mucosa are in places widely dilated, and crowded with bacilli.

In places on the peritoneal surface is an exudate composed of many red blood cells, a good many polynuclear leucocytes, a few mononuclear leucocytes, and fibrin.

The anthrax bacilli are found in all portions of the intestinal wall, though in greatest number in the submucosa.

The necrotic areas on the surface of the mucosa show very large numbers of bacteria; in the majority of instances, however, these do not appear to be anthrax bacilli, but a much shorter bacillus, though an occasional long bacillus resembling anthrax is seen.

In places, however, on the necrotic surface, masses of practically nothing else but anthrax bacilli are seen.

In the deeper parts of the mucosa, both the anthrax and shorter bacilli are seen, the anthrax bacilli being more numerous near the surface.

In the submucosa the bacilli are numerous; they are scattered throughout the inflammatory areas in small groups, and are found in large numbers in certain regions, viz.:

1. In or immediately beneath the muscularis mucosa in the form of a band of bacilli, closely woven, of about the normal thickness of the muscularis mucosa. Those immediately beneath the muscularis mucosa are evidently at times in the dilated lymphatics described above.

2. Along the borders of the blood-vessels of the submucosa, having a similar band-like formation, and being most numerous along the border of the vessel nearest to the mucosa.

3. At the junction of the longitudinal and circular muscular coats, in the form of a loose network.

The bacilli are found scattered through the circular muscular coat in fair numbers, often in quite large masses between the muscle fibres, and in these instances in the same areas where the polynuclears are abundant. The longitudinal muscular coat and the peritoneal exudate show a few bacilli, usually singly or in twos and threes.

REMARKS.

Clinically the case presents no very striking features. The œdematous form of anthrax is certainly rare in this country, but numerous cases have been reported elsewhere. That the infection took the œdematous form was probably due to its location, most cases of this variety occurring about the eyelids, presumably on account of the thinness of the skin and the loose character of the cellular tissue in this region.

Debrou[1] reported a very similar case in 1865, though in his case the intestinal lesions were not so far advanced as in ours, and there was no endocarditis present.

The occurrence of clinical symptoms, pointing to peritonitis and intestinal lesions, is worthy of note, as in a number of cases with extensive intestinal involvement no local symptoms at all were present.

Mahomed[2] and Haase[3] report such cases, whilst Verneuil[4] and Houel,[5] on the other hand, report cases similar to ours, with well marked abdominal symptoms.

The presence of abdominal symptoms may be of value in pointing out beginning intestinal involvement, as in a recent and interesting case reported by Schütte,[6] in which there were independent infections of the skin and intestinal tract at quite long intervals.

Schütte's case also illustrates the differences between primary and metastatic anthrax.

The patient was a butcher's apprentice, who assisted in killing a cow affected with anthrax.

Five days later there appeared on the upper lid of the right eye a carbuncle, the patient not complaining of abdominal symptoms until fourteen days afterwards.

At this time he had pain in the abdomen, constipation having preceded the pain for several days.

Death occurred on the 16th day after infection. Already at this time the malignant pustule had begun to disappear, but there was an extensive œdema over the face and neck, as well as of the mucous membrane at the entrance to the epiglottis. Moreover there was a typical anthrax "mycosis intestinalis," with hemorrhagic lymphadenitis of the mesenteric and retro-peritoneal lymph glands.

Although the spleen was not inconsiderably enlarged, anthrax bacilli could not be found, either in it or in the œdematous skin of the neck, neither could they be found in the neighborhood of the pustule, which was opened four hours post mortem; but streptococci and staphylococci were cultivated from the bloody fluid.

From the mesenteric lymph glands, in addition to colon bacilli, and streptococci, anthrax bacilli showing great virulence for mice were cultivated. These latter were found in large numbers in the pathological lesions in the stomach and intestines, where they occurred especially thickly, and at the inner margin of the necrotic tissues, becoming progressively fewer as the deeper layers were reached.

They were never found in the blood-vessels, though in these

there were many streptococci, these being especially numerous in the spleen.

In this case we have to deal with a primary carbuncle of the skin, and also a primary intestinal infection. From the latter situation the lymph glands became infected through the lymphatics. Upon these first infections there was added later a general streptococcus infection through the blood current. How did the intestinal infection occur?

It could not have occurred at the same time as the skin infection, inasmuch as fourteen days elapsed between the two. It could then only have occurred either in consequence of the scratching of the itching pustule by the patient himself (in which pustule, during life, anthrax bacilli had been demonstrated), the bacilli having thus been carried to the mouth; or the original blood had become dried on his hands or some other part, and the spores had been carried by himself into the intestinal canal.

Our case evidently differed entirely from this, the intestinal affection being secondary to the local one, and taking place through the blood current; the clinical symptoms show that the intestinal lesions occurred within a day or two of the original lesion, and the pathological findings leave no doubt as to the part played by the blood-vessels.

The case is interesting from a pathological point of view on account of the endocarditis, the peritonitis, and the intestinal lesions.

Endocarditis due to the bacillus anthracis appears to be rare; we have only been able to find two cases reported, both of them by Eppinger.[7]

Our case differs from both of Eppinger's, in that we found a perfectly fresh endocarditis on a previously normal valve, whilst in both of his cases, though there was a fresh endocarditis, there was also evidence of old valvular disease, the latter of course probably not due to the anthrax bacillus. The fresh vegetations in Eppinger's cases, and ours, were, judging from his description, of similar formation, though apparently the anthrax bacilli were present in much smaller numbers in his cases.

In one of his cases the evidence goes to show that the endocardial infection was not conveyed, at any rate not entirely, by the heart's blood, but took place by means of infective emboli, occluding the newly formed vessels in the chronically diseased valve. As Eppinger points out, this process could not occur in a normal valve, which is free from blood-vessels, and was only possible on account of the pathological vascularization brought about by the old endocarditis.

Actual peritonitis due to the anthrax bacillus would also seem to be rare.

In the cases of Mahomed,[2] Houel, and Waldeyer,[8] the peritoneal cavity contained large quantities of fluid of a serous character, but in none of these cases was fibrin present, though in Waldeyer's case the visceral peritoneum was injected and slightly cloudy. In none of the cases were the microscopical characters of the fluid ascertained.

In Krumbolz's[9] case fluid was also present, and though its microscopical characters are not mentioned, the anthrax bacillus was found in it, both in cover-slip and culture. It is quite possible that cultures and cover-slips would have shown the bacillus in all these cases, for in our case the fluid did not at all resemble pus, nor the ordinary serous peritoneal exudate, whilst the description of the fluid in the cases above mentioned would lead us to believe that it was probably similar in character. The intestinal lesions found in our case correspond very accurately, as far as the gross appearances are concerned, with those described by v. Recklinghausen,[10] v. Wahl,[11] Baumgarten[12] and others. We have been unable to find any minute microscopical description of these lesions, though in general characteristics the lesions seem to have corresponded fairly well with ours.

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A STUDY OF SUBCUTANEOUS FIBROID NODULES.

BY T. B. FUTCHER, M. B.

During the last two years several patients have been admitted to the Johns Hopkins Hospital, in Professor Osler's service, in whom this interesting complication has been observed. Considering the comparative infrequency of the condition and the meagreness of the literature on the subject in the medical journals of this country, it seemed appropriate that these cases, together with a number derived from other sources, should be reported. Before doing so, however, a short review of the literature will be given.

Although our knowledge of subcutaneous fibroid nodules is for the most part recent, yet they had been observed at least as early as the latter part of the last century, when Sauvages * described them, though he did not note their association with rheumatism, the merit of which is ascribed by Jaccoud to Froriep. Froriep's observation was made in 1843, but there has been some doubt expressed as to whether or not what he described was the true subcutaneous fibroid nodule of rheumatism. Hillier[39]† described them in 1868, whilst in 1871 Jaccoud[44] gave a very accurate and concise account of the nodules in his *Traité de Pathologie interne*. Meynet,[54] of Lyons, reported a case in 1875, one year after Barlow and Warner[3] observed the first case of their series. It is to the last mentioned writers that we are indebted for a good deal of our information concerning the subcutaneous nodules. They reported a series of 27 cases before the International Medical Congress held in London in 1881, and were the first to systematically study the nodules and draw definite conclusions from their observations. Since the report of their series, quite a number of cases have appeared in the literature, most of them, however, in British and French journals. In looking up the literature of the subject one would be led to suppose that subcutaneous fibroid nodules are a rare occurrence in this country, judging from the comparative infrequency with which cases have been reported in the medical journals. Dr. Osler[63] is of the opinion that rheumatism occurs much less frequently in Philadelphia and Baltimore than in London, and that subcutaneous fibroid nodules as a complication of rheumatism are a "great rarity" in these two cities. The first case reported in this country, so far as can be ascertained, was from Dr. Osler's clinic at the University Hospital, Philadelphia, by J. K. Mitchell[58] in December, 1888.

Cheadle[16] attributes the fact that the nodules are so often overlooked and so seldom described, to three reasons: (1) because they are rarely seen in adults, and that it is from adults that we take our ideas of rheumatism as a disease; (2) that they are not known of or looked for by the physician; (3) that they often escape notice by their smallness.

The nodules usually vary in size from a hempseed to a walnut. They are situated generally in the subcutaneous tissue, and as a rule are quite freely movable. Not infrequently they may be attached by their deep surface to the deep fascia, the sheaths of tendons and muscles, and occasionally to the periosteum. Sir Dyce Duckworth[24] is of the opinion that there are several different varieties of the nodules, and our observations would lead us to conclude that there are at least two distinct forms: (1) those which are comparatively small, extremely firm, distinctly rounded, and easily movable beneath the skin; (2) those which often grow larger, are softer in consistency, somewhat flattened and lobulated, and to which the skin occasionally is slightly adherent. The first class comprises the larger number of cases, and to it belongs the typical subcutaneous fibroid nodule. Those belonging to the second type appear to be of a fibro-lipomatous character, and seem to be less frequently associated with endocardial complications than do those of the first type. In certain cases both forms will be found associated in the same patient, as in cases V and VI of the present article.

Angel Money[59] claims that the subcutaneous tissue is not alone the only situation where rheumatic fibroid nodules are to be found. He holds that the heart muscle may be the seat of nodular masses similar in appearance and structure to those found in the subcutaneous tissue. He speaks of "nodular pericarditis" and "pericardial nodules," and considers the two conditions to be distinct. In an autopsy on a woman aged 20, the whole pericardial sac was found obliterated by fairly recent adhesions, and nothing nodular about the pericarditis could be detected. Three definitely sub-pericardial nodules were found, however, each about the size of a hempseed. Angel Money holds that they are the "true homologues of subcutaneous nodules and ought to be called subpericardial nodules."

The subcutaneous nodules may be found either in the neighborhood of joints, or, as is quite commonly the case, over the fleshy bellies of the muscles. The fingers, dorsal surfaces of the hands and feet, the vicinity of the olecranon and condyles of the humerus, the margins of the patella and neighborhood of the malleoli are the most common situations. Other less common situations are the superior curved line of the occipital bone, the temporal ridge and forehead, the vertebral and scapular spines, crest of the ilium and the fibrous structures of the intercostals. The skin over the nodules is usually freely movable and natural in color, although in certain instances it has been found somewhat thickened and reddened, and adherent to them as in Middleton's[56] case. When such a condition exists, it is supposed that friction has set up a certain amount of inflammation in the skin, resulting in its becoming adherent to the nodules. Rarely is there any pain complained of, but in some cases the nodules have been the seat of pain in damp weather, and their presence has also been associated with slight itching, as in the last mentioned case. At times slight pain is complained of during the growth and disappearance of the nodules, as in Case VI.

It would appear that instead of the nodules occurring as

* Davaine is the authority for this statement (Ref. 21).

† See literature at the end of the article.

distinct localized swellings, there may be a diffuse thickening of the subcutaneous tissue as in Hershman's case,[35] which was reported as "A Case of Progressive Enlargement of the Hands." As a proof that such a condition may possibly exist, this same patient had typical subcutaneous nodules about both elbows and over one patella, sections of one of these showing the general characteristics of the nodules, and there was in addition a distinct history of repeated attacks of rheumatism.

The nodules occur most frequently in children and young adults. Dr. Osler[61] has found them oftener in adults. In Barlow and Warner's series of 27 cases, 17 of whom were boys and 10 were girls, all the patients were under 19 years of age. Without being able to state positively, it would appear from the cases which have been reported, that females are affected oftener than males. The duration of the nodules varies very much. The shortest duration from the eruption to the disappearance of a single nodule in Barlow and Warner's cases was 3 days, and the longest 5 months. Sir Dyce Duckworth[24] reported two cases, in which in one instance the nodules lasted 18 months, and in the other 30 months. There may be only a single crop of the nodules, or, as is more commonly the case, a succession of crops, some nodules diminishing while others are increasing in size. They very rarely appear about joints that are acutely inflamed. Usually they make their appearance after the acute symptoms have subsided and the temperature has become normal. The onset of the nodules is not accompanied by a fresh rise in temperature.

In examining a patient for the presence of subcutaneous fibroid nodules, it is always necessary to make a very close examination of the body. If the nodules are quite small the patient himself will in all likelihood be ignorant of their presence, owing to the fact that in the majority of cases their growth is not associated with pain. An inspection of the body is therefore not sufficient; the neighborhood of the joints and the skin over the bellies of the muscles should be carefully palpated, as the nodules may be so small that their presence may be revealed only by this means.

Féréol and Davaine[21] have reported a number of cases of rheumatism, in which the skin and subcutaneous tissue presented small thickenings, which were due, not to a definite formation of fibrous tissue, but apparently to a localized œdema. These nodules rarely lasted longer than three days, and in many instances disappeared within 24 to 36 hours after their appearance. On account of their rapid onset and disappearance, and their association with rheumatism, they have been called by Féréol "nodosites cutanées éphémères chez les arthritiques." Some writers consider them to be quite distinct from the ordinary subcutaneous fibroid nodule, whilst others consider them allied, differing only in degree of development.

A number of very interesting cases have been reported in which subcutaneous fibroid nodules have been found associated with severe attacks of migraine. A case reported by J. Hobbs[41], of Bordeaux, is particularly interesting in this connection. The patient, a female, had for twelve years suffered from severe attacks of migraine, which were almost invariably associated with the onset of the menstrual periods, and on repeated occasions accompanied by the appearance of a subcutaneous nodule over the left frontal region. Upon the cessation of the menstrual flow the migraine and nodule disappeared. During one of the attacks the patient had quite an extensive crop of nodules over the forehead and scalp and about the right elbow. There was a distinct family history of rheumatism, and the patient's hands showed marked changes from chronic rheumatism. Davaine[21] reported three cases in which the onset of migraine was in each instance associated with the appearance of subcutaneous nodules over the frontal region. This condition is interesting as it seems to afford proof to the theory that migraine is sometimes rheumatic in origin, and the presence of the nodules would give a clue to the true cause of the migraine in cases where there was no apparent joint involvement.

Several instances have been recorded where subcutaneous nodules have been found in cases of osteo-arthritis. Newton Pitt[66] has reported several such cases, and states that the nodules have the same histological structure as those of rheumatism, although differing from them clinically in the following points: (1) they occur in adults; (2) they are much more chronic and last for years; (3) they are at times extremely painful and tender, the pain returning from time to time; (4) they are usually unassociated with any cardiac lesion; (5) they may vary in size from a small shot up to one inch in diameter, but they are generally larger than those of rheumatism. Payne[64] and Mahomed[52] have both observed the nodules in osteo-arthritis, the latter stating that they are not identical with those of rheumatism.

As regards the gross appearance of the nodules, Cheadle[16] says that "when they are exposed by dissection, they appear as oval, semi-transparent, fibrous bodies, like boiled sago grains." The accounts of microscopical examinations vary considerably, but agree in a general way in that the nodules appear to be made up essentially of fibrous tissue in various stages of development. The examination made by Barlow and Warner showed the nodules to be made up of a fibrous network, with caudate, spindle-shaped and nucleated cells and a large number of blood-vessels. They suggested that the appearance presented many of the characteristics of organizing granulation tissue. In a number of instances where microscopical examinations were made, the blood-vessels have been found markedly increased in number, and special stress has been laid on the changes in the blood-vessels themselves. In Middleton's case already mentioned, the nodules were made up largely of connective tissue in various stages of development. Blood-vessels were almost entirely absent from the centre of the nodules, but at their periphery the arteries were abnormally numerous, and in many instances their coats were thickened by an infiltration of cells, the tunica intima being frequently particularly affected. The middle coat was also considerably thickened and dissected by a collection of cells. Groups of these cells frequently extended to a considerable distance from the vessels, and in many instances they mapped out the course of the minute vessels in the papillæ of the skin. Middleton thought, on account of the marked changes in the blood-vessels, that the nodules might possibly be vascular in origin, as if produced by some irritant carried

in the blood. Cavafy[13] found a marked proliferation of the endothelial cells in many of the blood-vessels in addition to the changes in the vessel-wall noted above. The vascular changes are not always a feature, however. In J. K. Mitchell's[56] case the histological examination made by Dr. Osler showed "a dense fibrous stroma, with cells chiefly ovoid, the ends prolonged into fibrils. There was no such arrangement of round-celled elements, as in granulation tissue, which Barlow found in his specimens. The extreme toughness of the nodules indicates that they have undergone conversion into fibrous tissue. In teased specimens there were places in which the fibres were closely set together, as in embryonic connective tissue, but in the larger part very few cells could be seen among the wavy bundles of fibres."

The microscopical examination of the nodules from Case I of the present article (the full account of which will be given with the report of the case) showed several interesting features which, so far as can be ascertained, have not been previously noted. Briefly stated, these consisted of a definite hyaline degenerative change in the fibrous tissue in many places, whilst in other situations areas of calcareous degeneration were to be made out. The sections also showed the presence of giant cells and minute hemorrhages.

One of the most interesting features in regard to the nodules is that they disappear without leaving any apparent indication of their previous existence or situation. This seems remarkable, as definitely formed fibrous tissue, when once present, is not supposed to undergo absorption and disappearance. The same nodules may at various times undergo a diminution and increase in size. On account of the marked vascularity of the nodules this would be readily explained by a vaso-motor influence causing contraction or dilatation of the vessels.

Barlow and Warner stated that the nodules were in their nature probably homologous with the inflammatory exudations which form the vegetations on the cardiac valves. F. D. Drewitt[32] has suggested that they might be related in their origin as well as in their nature. In the case of the cardiac vegetations, they generally occur on the free margins of the cardiac valves, where they are constantly subjected to the friction of the blood current, and when the valves become inflamed, to friction on each other as well. Likewise, the nodules are most commonly found over the most prominent part of the joints, where they are most liable to be subjected to injury and friction. Dr. Drewitt brought forward further proof of his theory that friction may be a factor in the production of the nodules, or at least in determining the position where the nodules occur. He stated that if the nodules make their appearance in a patient with rheumatism, who is kept constantly in bed on his back, they will occur in greatest numbers over the occiput and the spinous processes of the vertebræ, situations in which, under ordinary circumstances, they rarely occur.

Subcutaneous fibroid nodules are considered by such authorities as Barlow and Warner and Cheadle as a positive indication of the existence of a rheumatic taint in the individual in whom they may be found. It would appear that rheumatic cases with endocardial complications seem to be most liable to this interesting complication. This is borne out by the fact that in the majority of the cases which have been reported endocarditis has been present. A synopsis of Barlow and Warner's series of cases shows how grave the cases are in which the nodules occur. Of the 27 cases there was a distinct history of arthritis in 19, whilst 6 others had definite joint pains. In every case there was evidence of endocarditis, either mild or severe; pericarditis was present in 8 cases; in 10 there were definite choreiform movements, and 8 out of the 27 cases proved fatal. Cheadle holds that the presence of the nodules in a case of rheumatism is of very grave import, especially when they occur associated with definite signs of endocarditis, as he has found in his experience that the heart complication is "persistent, uncontrollable and marches almost infallibly to a fatal end" and is practically equivalent to signing the patient's death-warrant. He also maintains that the gravity of the case is in direct proportion to the number and size of the nodules. Other observers have noted the progressive character of the heart lesion in cases of rheumatism associated with subcutaneous nodules.

Edge[29] is of the opinion that cases in which the nodules occur without any associated endocarditis appear to be more common in adults than in children.

In some instances it has been noted that the heart-murmur has diminished in intensity with the disappearance of the nodules. Whether or not this is of any practical importance is doubtful, as the intensity of the murmur bears no definite relationship to the gravity of the heart lesion.

C. H. Brown[12] reported a case which was particularly interesting, in that it was the first case reported in this country in which there was an association of rheumatism, chorea, endocarditis and subcutaneous fibroid nodules. Case II showed a similar combination, and as far as can be ascertained these are the only two such cases that have been reported in this country. Brown is of the opinion that cases of rheumatism which are associated with chorea are specially liable to the occurrence of subcutaneous fibroid nodules.

Fibroid nodules are rarely an accompaniment of acute rheumatism. They occur most commonly after the acute symptoms have subsided and their presence indicates that the rheumatism is very likely to run a chronic course, so that one should be guarded in his statements to the patient or his friends as to whether or not recovery will be rapid and complete.

Just as the nodules have been shown to be of some value from a prognostic standpoint, so in certain cases they may aid us in establishing a relationship between rheumatism and certain morbid conditions found in a patient. For instance, they were of great importance in arriving at the cause of the neuritis in Case VII. Not infrequently the nodules occur in patients without there being any evidence or history of pain or swelling of the joints. If we are to believe the statement of Barlow, Warner and Cheadle that the presence of the nodules is an absolute indication of a rheumatic taint, then their occurrence in cases of chorea and endocarditis without any joint involvement would prove the connecting link between these diseases and rheumatism.

There are several conditions which might be mistaken for the subcutaneous nodules of rheumatism:

1. Traumatic painful subcutaneous nodules. In this case there would likely be a history of traumatism; the nodules would be limited to possibly one or two in number and would be painful.

2. In the case of the ephemeral nodosites of Féréol, the true skin itself is involved; the nodules are not so hard and fibrous and disappear very suddenly.

3. Erythema nodosum might possibly be mistaken for the rheumatic nodules. In this condition the skin between the knee and ankle is usually the part involved. The thickening is in the true skin. The nodes are larger in diameter than the fibroid nodules usually are, the skin over the affected area is usually reddened and undergoes a series of changes in color. The affected areas in erythema nodosum are painful and tender to the touch.

4. Subcutaneous syphilitic gummata might at first present a somewhat striking resemblance, but in this condition the skin would soon become adherent to the mass, and the whole would present the characters of an inflammatory tumor. A possible history of lues and other evidences of syphilis would put one on his guard.

5. In cases where tophi are deep-seated about the joints, as they not infrequently are, there might be some difficulty in diagnosis. Where such are present, there would most likely be others present in the ears, showing the deposition of urate of soda. The history of the case would also give a clue to the true condition.

6. Urticarial wheals show a slight resemblance, but would be distinguished by the skin itself being involved, and the areas presenting a whitish centre surrounded by a reddish halo. Pruritus would be marked, and there would in all probability be a history of gastric disturbance.

7. Heberden's nodosites might be mistaken for the nodules. The former are limited to the sides of the distal phalanges, are hard and firmly united to the phalangeal bones of which they form a part.

8. A number of cases of subcutaneous nodules associated with syphilis have been reported. These do not appear to be gummatous in character, and present a striking resemblance to fibroid nodules of rheumatism. Careful inquiry should be made for a syphilitic history in all cases where nodules are present without any apparent joint complication. Cases of fibroid nodules in syphilis have been reported by Lailler,[46] Dr. Stephen Mackenzie,[50] Sir Dyce Duckworth,[26] and Dr. Kingston Fowler.[31a]

9. The fibroid nodules of osteo-arthritis are very similar to those of rheumatism, but Dr. Newton Pitt claims to be able to distinguish them by the points already given.

10. Certain benign growths, as lipomata and fibromata, might be mistaken for fibroid nodules. The lipomata are larger, softer and more lobulated than the nodules, and are situated most commonly over the back and shoulder-blades. More difficulty would be found with the fibromata, as the fibroid nodules are really of a fibromatous nature.

The nodules seem to have a life history of their own and appear to be uninfluenced by any special treatment. One should treat the disease of which they are only a symptom.

Case I.—*No history of rheumatism; enormous hypertrophy and dilatation of the heart; adherent pericardium; chronic proliferative peritonitis with ascites; subcutaneous fibroid nodules; no endocarditis.*

Louisa R., aged (on admission) 13, an occupant of Ward G, with the exception of a few months at a time, from May 14, 1891, to December 8, 1894.

Father and mother are living and well; no rheumatism in the family.

The patient has had measles, scarlet fever, and whooping-cough; she has never had rheumatism or chorea. The mother is positive that there never has been any swelling or tenderness of the joints. Some time before admission to the hospital she had for a time pains in the muscles of the right arm.

Her illness began in the summer of 1891 with swelling of the feet and shortness of breath.

In the three years and a half during which she was under observation she had all the signs of enormous dilatation and hypertrophy of the heart; there was a loud, rough apex systolic murmur, and we regarded the case as one of extreme mitral insufficiency from disease of the valve, with secondary great enlargement of the right heart. She had a pulsating liver, which gradually shrank. The recurring ascites was attributed to proliferative peritonitis and perihepatitis, and it was thought probable that she had adherent pericardium.

She never at any time had swelling of the joints; for the past eighteen months she had extreme and persistent cyanosis of the arms and legs.

About two years before her death we noticed for the first time the presence of subcutaneous fibroid nodules. They were most numerous about he elbows and along the margin of the ulnæ. A few were also noticed about the wrists and over the ankles. The majority of them were small and shotty, though one or two about the elbows were larger and broader. They never were at any time painful; a majority of them were very persistent, but one or two of these about the elbow disappeared.

This case is of a good deal of interest, as the presence of the subcutaneous fibroid nodules, even in the absence of a rheumatic history, rather tended to corroborate our view that she had disease of the mitral valve segments.

The autopsy showed colossal enlargement of the heart, which occupied nearly the whole of the front of the chest. The pericardium was adherent, particularly over the right chambers. The cardiac orifices were enormously dilated, but the valves themselves, beyond a trivial thickening, were not involved.

On microscopical examination the nodules are seen to be made up essentially of fibrous tissue in various stages of development. The older portions consist of a rather dense fibrous connective tissue in which the fibres are arranged in bundles running parallel to each other. Other portions are composed largely of cellular elements, which under a high power are seen to consist of small round cells, fibroblasts and polynuclear leucocytes. In these situations blood-vessels are quite numerous, so that to a certain extent there is a resemblance to granulation tissue, as Barlow and Warner noted in their specimens. Several giant cells were present in the younger portions of the nodules, twenty-six nuclei being counted in one of these. The transition from the young portions to the well developed fibrous tissue is quite gradual.

Some of the sections show a very interesting feature in the occurrence of a definite hyaline degeneration of the fibrous tissue in certain situations. Where this degenerative change is most marked, the fibrous tissue appears to be arranged in bundles with a concentric distribution of the fibres, so that when the bundles are cut transversely they appear to be made up of a series of concentric rings. This hyaline degeneration also occurs, though to a less marked degree, in situations where there is not this special arrangement of the fibres. A further interesting feature is the occurrence of a distinct calcified change in these areas of hyaline degeneration at certain points. Portions of the fibrous tissue which have

undergone hyaline change show quite marked cellular infiltration, which, however, is almost entirely absent in the areas of calcification. The calcareous deposit appears to take place between the layers of fibres which have undergone hyaline change.

The vascularity of the nodules is quite a striking feature. The blood-vessels are most numerous at the periphery of the nodules, the central portions being comparatively free, excepting in the areas of cellular infiltration where minute blood-vessels are present. Some of the larger vessels show an infiltration of small round cells into their walls, these, in certain instances, extending some distance into the surrounding tissue. Many of the blood vessels contained an excess of polynuclear leucocytes, which in some cases almost fill the vessel; other vessels are occluded with plugs of fibrin. In one or two instances there is a distinct proliferation of the endothelial cells, the lumen of the vessel being almost filled with the proliferated and desquamated cells.

Minute hemorrhages into the connective tissue are seen in several situations.

The nodules are for the most part quite circumscribed, although cellular infiltration into the surrounding connective tissue does occur to a greater or less extent.

CASE II.—*Rheumatism, chorea, endocarditis and subcutaneous fibroid nodules.*

F. F., male, æt. 16, was admitted to the Johns Hopkins Hospital in Dr. Osler's service, June 29, 1894, complaining of pains in the wrist joints and nervousness.

The family history was unimportant; no history of rheumatism in any member of the family.

The patient had measles, chicken-pox, mumps and diphtheria when a child. There was no history of his having had scarlet fever. From childhood up to the onset of the illness for which the patient was admitted to the hospital he had always had good health. Used tobacco and stimulants moderately; denied having had gonorrhœa or syphilis.

The patient's illness began 10 weeks previous to admission to the hospital with sudden swelling of the right ankle-joint, which was also very tender to the touch. Skin over the joint was reddened. During the first week of the illness almost all the large joints became affected, the ankles, wrists, left tempero-maxillary joint, knees and hips being involved in the order named. All these joints were swollen and painful, so that during the second week he was unable to move in bed. Improved gradually during the third week, and at the end of the fourth week patient was able to get up. Since then patient had several relapses, having had to go to bed for one week.

Five days previous to admission, patient began to have involuntary movements of the arms, legs and tongue, which, however, were not so severe as to prevent his getting about. Two days previous to admission, however, the movements of the arms became very violent and uncontrollable, and those of his tongue interfered very much with his talking. Deglutition was not interfered with. There were slight spasmodic movements of the facial muscles, but the patient could not say how long they had been present.

No symptoms specially referable to the heart were complained of.

An examination of the patient on admission, showed but slight evidences of rheumatism, all the joints being moved quite freely without causing much pain. Complained of slight pain in the metacarpo-phalangeal and phalangeal joints of both hands, which were slightly tender on palpation.

The backs of both hands showed numerous subcutaneous fibroid nodules, particularly in the neighborhood of the metacarpo-phalangeal joints, about each one of which there were from four to five nodules. The nodules were present also about the phalangeal joints, but in smaller numbers. The wrists were free, but there were several nodules about the elbow-joints, chiefly over the olecranon processes and condyles. No nodules were to be found on any other part of the body. The nodules varied in size from a pin's head to a split pea, the skin being freely movable over them and not reddened. Those over the metacarpo-phalangeal joints were best seen by tightly closing the hands.

The patient exhibited slight, but definite choreiform movements in the arms and hands, with occasional twitchings of the leg and facial muscles.

The lungs were clear throughout on percussion and auscultation.

The point of maximum cardiac impulse was best seen in the fourth space in mammillary line. No thrill was to be made out. Relative cardiac dulness began at the third rib; extended transversely from the left sternal margin to a point 2 cm. outside the nipple line. At the point of maximum cardiac impulse there was a rough systolic murmur to be heard, this being also well heard along the left border of the sternum.

The examination of the urine showed it to be practically normal, although at a subsequent examination a faint trace of albumen and a few granular casts were found.

The general condition of the patient while in the hospital improved markedly. The examination of the patient on August 15th, the day on which the patient left the hospital, showed that the choreic movements had practically ceased and the joints had entirely cleared up. An occasional nodule could still be made out on the backs of the hands and there was one still to be seen over the right elbow.

The examination of the heart showed that it had undergone a definite change. The point of maximum impulse was now in the fourth space 2 cm. outside the mammillary line. Relative dulness began at the second rib. The first sound at the apex was sharp and snapping, and was followed by a slight systolic whiff, traceable into the axilla. There was now a short presystolic murmur audible at the apex. A slight, soft systolic murmur was to be heard over the base of the heart and a systolic puff over the vessels of the neck.

The thyroid gland was distinctly enlarged, the right side being a trifle the larger. Eyes were not particularly prominent. The usual range of the pulse was between 108 and 128.

The highest temperature at any time during his stay in the hospital was 101°, and it had been normal for 3 days previous to his discharge.

The treatment was rest with ol. gaultheriæ and liquor arsenicalis in increasing doses. Patient was taking 20 minims of Fowler's solution 3 times a day previous to his leaving the hospital.

The above case is interesting in that it shows the very unusual association of rheumatism, chorea, endocarditis and subcutaneous fibroid nodules in the same patient. It was also interesting on account of its showing that the cardiac changes were progressive, the heart increasing definitely in size and the murmurs changing in character. An effort has been made to try and find out the patient's present condition, but we were unable to get any information with regard to him. So far as can be ascertained, the only other similar case reported in this country was that of C. H. Brown. Mackay reported a similar case in the *Lancet*, the patient making an excellent recovery.

CASE III.—*Rheumatism, aneurysmal dilatation of the aorta, and subcutaneous fibroid nodules.*

P. H. D., colored, male, æt. 49, was admitted to the Johns Hopkins Hospital, in Dr. Osler's service, November 22, 1894, complaining of pain in the left side and shortness of breath.

The family history was unimportant; no hereditary disease in the family.

There was no history obtainable of the patient having had any of the diseases of childhood. Had small-pox when 29, and facial erysipelas when he was 36 years of age. There was no history whatever of rheumatism previous to three years before admission, when patient began to complain of severe pain in the fore part of

the left foot, which was excessively tender and considerably swollen. Confined to bed two weeks. No other joint involvement. Had gonorrhœa when 39; no history of the initial lesion or any secondary symptoms of syphilis obtainable.

Eight years ago, five years previous to the "rheumatic" attack, patient noticed in front of his right knee a small lump which felt like a shot under the skin. Four or five months later a similar lump appeared over the front of the left knee, and subsequently one appeared over the right and left elbows in the order named. The nodules made their appearance without any apparent cause. They felt to the patient like "bird-shot" beneath the skin, were always freely movable, and at no time painful. Their size had gradually increased until one year previous to admission, since when they had remained stationary. Patient never knew them to diminish in size and increase again. He had never seen similar lumps on any other part of the body.

The symptoms of which the patient complained, on admission to the hospital, began three weeks previously, with pain of a constant aching character in the lower part of the left side of the chest. Occasionally the pain was sharp and shot up towards the left shoulder, but never down the arm. It was worse on exertion and deep breathing. Patient had had dyspnœa for four or five days, and occasional attacks of palpitation and vertigo. No histor of œdema of the feet. Appetite good; bowels regular.

An examination of the patient, on admission, showed him to be a well formed, well developed man. There was marked pulsation of the carotids and subclavians, and that of the radials was visible. Radial pulse was 76 to minute, regular in force and rhythm, good volume, and somewhat collapsing in character, though not typically so.

On the left elbow there were two large, subcutaneous, movable, lobulated nodules, the larger, 3x4 cm., being situated just behind the internal condyle, the smaller, 2.5x2.5 cm., just below the tip of the olecranon. On the right elbow, just below the tip of the olecranon, there was a still larger nodule, measuring 4x5 cm., and just by the side of this a smaller one, not larger than a split pea. On both knees, just below the patella, were similar nodules, the one on the left side being 3x3 cm., that on the right being a trifle larger and consisting of an agglomeration of smaller ones. These nodules were all moderately firm. They had never been painful and were not tender on palpation.

Lungs were clear throughout on percussion and auscultation.

The examination of the heart showed rather interesting changes. The point of maximum cardiac impulse was in the fifth space, 1 cm. outside the mammillary and 11 cm. from the midsternal line. Relative dulness began at the fourth rib, extended transversely from the left sternal margin obliquely outwards to the point of maximum impulse. At the point of maximum impulse the first sound was dull, preceded by a very faint rumble, and followed by a slight systolic murmur, which was lost 4 cm. outside the point of maximum impulse. Second sound quite sharp. Immediately inside and above the point of maximum impulse the first sound was preceded by a distinct presystolic rolling sound, which was heard over a very small area. Passing inwards and upwards from this point the sounds were represented by a double murmur, a systolic and a diastolic, the latter being best heard along the left border of the sternum and in the aortic area. In the second right interspace the sounds were quite loud, the first being represented by a harsh systolic murmur, the second by a well marked, somewhat accentuated second sound, followed by a slight murmur.

The further physical examination of the patient revealed nothing of importance, with the exception of a symmetrical enlargement of the parotid glands.

On December 23 it was noted that the radial pulse had become distinctly collapsing in character.

On Jannary 24, 1895, there was noticed for the first time a pronounced throbbing over the second costal cartilage and interspace on the right side close to the sternum. This was both visible and palpable. Percussion note was slightly dull over this area. The double murmur was still audible as on admission. Tracheal tugging was just to be made out.

An examination of the patient on February 8, 1895, revealed a striking difference in the volume of the two radial pulses, the right being much smaller than the left. There was no inequality of the pupils. The pulsation above noted had extended upwards, and on this date there was a distinct lifting of the inner end of the right clavicle and the sterno-clavicular articulation with each heart beat. This pulsation was most marked in the recumbent posture, almost disappearing when the patient sat upright. It seemed to be less marked over the second right cartilage and interspace where it was first noted. No thrill was to be made out over the pulsation, but a distinct thrill was to be felt over the vessels of the neck.

About two weeks later, February 26, the patient became very hoarse and cough was very distressing. Large quantities of ropy, tenacious sputum were expectorated. Microscopical examination of the sputum on this and subsequent occasions failed to show the presence of tubercle bacilli. For the first time it was noted that there was an inequality of the pupils, the right being larger than the left. Patient had been passing a diminished amount of urine, which contained a distinct trace of albumen and numerous hyaline and finely granular casts. The lifting of the right clavicle did not seem so marked as on previous examinations. The double murmur was to be heard as before.

From this date on the patient's general condition seemed to be gradually getting worse. He suffered intensely from severe attacks of dyspnœa and palpitation of the heart. A laryngoscopic examination by Dr. Warfield on March 8th showed a complete paralysis of the left aryteno-epiglottidean fold, although the cords did not seem to be affected. The attacks of dyspnœa and palpitation gradually became more severe, and face became swollen, particularly on the right side.

The subcutaneous nodules were much the same as on admission, being possibly a trifle smaller. There had been no appearance of any fresh nodules on any part of the body. Patient did not have any evidences of arthritis while in the hospital.

On March 14 the patient became unconscious and died at 9.30 p. m.

Post-mortem. Only the most important parts of the post-mortem examination will be given. The heart and aorta showed very interesting changes. The heart was both hypertrophied and dilated; both ventricles were involved particularly the left. Left ventricle averaged 19 mm. in thickness and was 9 cm. in length. Average thickness of right ventricle was 4 mm., the length being 9 cm. Mitral orifice measured 10 cm. in circumference, and the mitral valve appeared quite normal. Tricuspid orifice measured 12.5 cm. in circumference; valves were normal. Pulmonary valves were normal. Both auricular appendages contained recent thrombi. The aortic valves were thickened and retracted at their margins. The aorta measured 8 cm. in circumference just above the valve. There was a diffuse dilatation of the ascending and transverse portions of the arch of the aorta. The circumference of the aorta, at the origin of the innominate, was 10 cm. At the beginning of the thoracic aorta there was a farther dilatation which extended for a distance of 17 cm. It extended backwards and to the left, was spindle-shaped and involved all the coats. The central part of the dilatation was covered with light, adherent, laminated fibrin. This dilatation measured 12 cm. in circumference at the beginning, 13 cm. at the widest part, and 8 5 cm. at its inferior extremity. It was adherent to the fourth and fifth dorsal vertebræ, the bodies of which were eroded by pressure. The aorta was the seat of extensive nodular endarteritis. There were adhesions between the pericardial sac and the aorta.

Both lungs were partially bound down by old adhesions.

Kidneys showed marked chronic diffuse nephritis.

The left pneumogastric and recurrent laryngeal nerve were pressed on by a calcified pigmented gland.

Unfortunately no specimens of the nodules were obtained at the

autopsy, so that a report of the microscopical examination of these cannot be given.

The above case is interesting on account of the long duration of the nodules—8 years, and from the fact that they appeared 5 years before the patient had had an attack of rheumatism. The heart and aortic changes were interesting, as the aneurysmal dilatation practically took place while the patient was under observation in the hospital wards.

CASE IV.—*Rheumatism and subcutaneous fibroid nodules without endocarditis.*

J. B. T., male, æt. 28, a hospital employee, was admitted to the Johns Hopkins Hospital, Dr. Osler's service, June 24, 1895, complaining of pains throughout the body, vomiting, diarrhœa and sore throat.

Father was living at 68 years of age and had always been subject to attacks of rheumatism from childhood up. After a rheumatic attack when 20 years old he had numerous nodules appear beneath the skin of the arms and legs, some of which the patient states have persisted up to the present time. According to the patient's statement, these nodules would increase in size during an attack of rheumatism and diminish again afterwards. Could not say whether his father had crops to appear and disappear. Most of the nodules were the size of hazel-nuts but were never painful. Patient's paternal grandfather was disabled for 22 years as the result of repeated rheumatic attacks. A paternal aunt was subject to rheumatism, and a second died of apoplexy.

Patient had had measles, chicken-pox and mumps. When 14 years old he had a severe attack of pain in the lumbar region of the vertebral column, and also in the muscles on each side and over the shoulder-blades. Was confined to the house for 2 weeks, and had to be propped up in a chair. It was 6 to 8 months before he was able to get about properly, and since then he has never been able to do much stooping without causing pain in the back. About the time of this attack the patient noticed a lump about the size of a hazel-nut on the dorsal surface of the right forearm about 3 inches above the wrist joint, and a similar one on the palmar surface of the left forearm about the same distance from the wrist. These have persisted up to the present time, never having entirely disappeared. During an attack of pain in the joints, the nodules would become larger and harder and afterwards diminish in size again. Since the attack of pain in the back when 14, patient has had repeated attacks of pain in nearly all the larger joints of the body, which, however, have never been swollen. Has had nodules appear and disappear during these attacks. Two years ago patient had a severe attack of pain in the left ankle, which prevented him from working for 3 or 4 months. Joint was not swollen. During this attack the patient noticed several nodules appear on the front and outer aspect of the left thigh, and two between the crest of the ilium and the left costal margin. Three of these on the thigh and the two last mentioned ones have persisted to the present time. Several mild attacks of pain in the joints have occurred since two years ago, and several nodules have appeared and disappeared since then.

Had an attack of dysentery when 19, which lasted one year; malaria when 18; pneumonia 3 years ago. No history obtainable of gonorrhœa or syphilis. Never had chorea or palpitation of the heart.

The symptoms of which the patient complained on admission began five days previously with pains in the elbow, shoulder, knee and ankle-joints, and pain in the back. Pain was severe, and he had a stabbing pain beneath the right shoulder-blade. Soon after the joint pains began his throat became slightly sore. These symptoms continued up to the time of admission, previous to which for 24 hours he had had nausea, vomiting and diarrhœa, which he attributed to an indiscretion in diet.

The patient was a large framed, healthy-looking man. Pulse was 100 to the minute, regular, good volume; vessel wall not thickened. Throat was slightly reddened, but tonsils were not swollen. Joints were all slightly painful, but not swollen. The following were the situations of the nodules:

Right arm: 1 on the outer side of the arm 8 cm. above the external condyle, 2 on the anterior aspect of the forearm over the flexor muscles, and 2 on the posterior surface over the extensors. These varied in size from 1 to 2 cm. in diameter, were strictly subcutaneous and movable, moderately firm, somewhat flattened and not tender.

Left arm: 1 nodule, 1x1.5 cm., about 4 cm. above the wrist on anterior surface of forearm. It was subcutaneous, movable on the deep structures, rather firm and flattened. This was in all probability the one which had been present since the onset of the rheumatism when patient was 14.

Left thigh: There were 4 nodules on the outer and anterior aspect of the middle third of the thigh, all of which measured 2x2 cm., and one of which was rather tender on palpation.

About midway between the iliac crest and the left costal margin there were two separate nodules, which were rather deep and measured 3x3 cm. They were rather deep-seated and somewhat tender. Skin was less freely movable over them than in the other instances.

Lungs were a trifle hyper-resonant on percussion. Few fine, moist râles heard in right axillary region.

The point of maximum cardiac impulse was neither visible nor palpable. Heart-sounds best heard in 4th space, 3 cm. inside the mammillary line. The relative dulness did not begin until the 4th rib was reached. The heart-sounds were clear at apex and base, and of normal intensity. No murmurs were to be made out.

Physical examination was otherwise also negative.

The long standing of the nodules, some having lasted 15 years and others 2 years, the occurrence of nodules in the patient's father, and the absence of any cardiac lesion, makes the case an interesting one.

CASE V.—*Rheumatic history, subcutaneous fibroid nodules and doubtful carcinoma of the stomach.*

Mr. U., æt. 57 years, was admitted to the Johns Hopkins Hospital, June 21, 1895, complaining of general weakness and nausea.

There was a distinct history of tuberculosis in the family, his father and two sisters having died of it. No history of rheumatism or malignant disease in the family.

When a child the patient had measles, whooping-cough and mumps. Gave a doubtful history of his having had typhoid at the age of 27. After this attack of fever he had diarrhœa each spring for 6 or 7 successive years. Had gonorrhœa when 21, but there was no history of lues obtainable. He had had frequency of micturition at night for 3 or 4 years. Two years previous to admission he had a mild attack of rheumatism in the ankles. There was no history of chronic stomach trouble. Used tobacco and alcohol in moderation.

The illness for which the patient came to the hospital began four months previously with severe pains in the shoulders, arms and, to a less extent, in the knees. The joints were apparently not swollen. During the attack he had severe nausea and vomiting, which was not specially associated with the taking of food. He did not vomit any blood. His appetite was poor and nausea was constant, being increased by the sight of food. Flatulence was a prominent symptom. Had not had any pain in the epigastrium. Was gradually losing flesh.

The patient was not aware of the presence of any lumps beneath the skin.

He was rather pale and somewhat emaciated.

In the parasternal line, about 5 cm. below the costal margin, a small nodular thickening, definitely situated in the abdominal wall, was to be felt on palpation. The mass was somewhat lobulated and rather soft. On the exterior surfaces of the forearms several similar ones of a fibro-lipomatous character were to be seen

and felt. They were freely movable and the skin was not adherent to them. Along the outer margin of the right tibialis anticus tendon there was a very hard subcutaneous fibroid nodule, and another occupied a corresponding position on the left foot.

The heart and lungs were clear throughout.

An Ewald's test-breakfast was given on two occasions, the contents of the stomach when removed showing an absence of free hydrochloric acid on each occasion. There was no reaction for lactic acid, however.

After inflation of the stomach the lower margin did not pass a point 4 cm. above the umbilicus. A slight sense of induration was to be felt in the left parasternal line, which was not to be made out when the stomach was empty.

The patient lost considerably in weight while he remained in the hospital.

In the above case we have the two forms of the nodules present in the same patient, the soft, flat, comparatively large fibro-lipomatous form, and the small, round, very firm variety.

Case VI.—*Rheumatism, subcutaneous fibroid nodules, with cardiac hypertrophy.*

The following case was shown by Dr. Toulmin (now of Philadelphia), at the Hospital Medical Society when he was a resident medical officer in the medical service. The case was not reported, and I am indebted to Dr. Toulmin and Dr. Hobach for finding the address of the patient and permitting me to examine him.

Mr. G., æt. 55, was seen at his own house.

There was nothing of importance in the family history. The patient had whooping-cough and mumps when a child. When 22 years of age he had his first attack of rheumatism; both ankles and right hip joint were affected, being very painful, but not swollen. He was laid up for two months, but did not have any subcutaneous nodules at that time. From then until eight years ago he had several mild attacks of rheumatism. Patient had not complained of any heart symptoms up to this time. Eight years ago he had a right-sided hemiplegia, speech being affected, which lasted three months. Does not remember whether he had any joint involvement at that time or not. It was during this illness that the patient first noticed the presence of lumps beneath the skin on various parts of the body. His physician counted as many as 140 at this time. Quite a number of these occurred over the epigastrium, and the patient states that the one which is still to be seen and felt in this region first appeared at that time. Some of the lumps were as large as walnuts, were all freely movable, and were painful when they were growing or diminishing in size. Other situations where the nodules appeared at that time were: one on the left under eyelid; several painful ones on the scalp and on the back of the neck at the junction of the cervical and dorsal regions; others were present on the anterior surfaces of the arms, forearms, thighs and legs. The patient states that in all the last mentioned situations the nodules varied in size between a pea and a hazel-nut, most of them disappearing within 24 hours, and none lasting longer than three days.

Since eight years ago the patient has had repeated crops of nodules, at no time being perfectly free from them.

In October, 1892, he had a second attack of right-sided hemiplegia which laid him up eleven weeks. Again he had a profuse crop of nodules. The right ankle joint was swollen and painful, and he suffered from dyspnœa and slight precordial pain. Since then he has not had any further joint trouble, and has always been able to attend to his work.

The patient was a healthy looking, fairly well nourished man. Pulse was 92 to min., regular, good volume, vessel wall a trifle thickened. Subcutaneous nodules were present in the following situations: one beneath the costal margin in the left hypochondrial region, 3 x 3 cm., soft, somewhat lobulated and rather sensitive on palpation. This was of a fibro-lipomatous nature.

Right arm: One in front of internal condyle .5 x 1 cm.; five on the anterior surface of forearm, varying in size from a bean to a hazel-nut.

Left arm: One about the size of a hazel-nut above the external condyle on the outer side of the arm; four on the ulnar side of the forearm, also varying in size between a bean and a hazel-nut. All the above were rather flat and not extremely hard.

Right leg: Two over the extensor tendons on the dorsum of the foot, and one apparently in the skin about 4 cm. above the ankle. These were in size between a pea and a bean.

Left leg: One about the size of a bean on the inner surface of the tibia about 11 cm. above the ankle. It was very hard, round, quite movable, subcutaneous, and extremely sensitive to the touch. Excepting for the tenderness it presented all the characters of a subcutaneous fibroid nodule. The patient had been forced for years to wear boots, owing to the pain in the nodules produced by wearing laced shoes.

The Lungs. Hyper-resonant on percussion, but otherwise were clear.

The Heart. The point of maximum cardiac impulse was in the sixth space, 1 cm. inside the mammillary line. The relative cardiac dulness began at the third rib and extended from the left sternal margin obliquely outwards to the point of maximum impulse. The first sound at the apex was distinctly prolonged and softened, but there was no definite murmur to be made out. Passing upwards along the left border of the sternum, a very faint systolic murmur was to be heard, the murmur being of maximum intensity over the pulmonary area. Both aortic sounds were quite clear.

This, like the preceding case, shows the association of the two varieties of subcutaneous nodules in the same patient.

Case VII.—*Rheumatic neuritis with subcutaneous nodules.*

I am indebted to Dr. Osler for the notes of the following interesting case:

Mr. H., aged 60, seen with Dr. Lockwood, July 1, 1895, complaining of pains in the arms and legs.

Patient is a tall, spare man, who has always enjoyed good health with the exception of dyspepsia, to which he has been subject at intervals for many years. He has taken very good care of himself, is a moderate drinker, and has an excellent family history; no gout; no rheumatism.

Early in March of this year he began to feel pain in the right leg, chiefly about the ankle and instep. It was as though he had a band about these places. The pain was sharp, but never very acute. He has felt at times a little numbness and tingling, and on several occasions there was a little redness of the skin about the ankle. Shortly afterwards the left leg became affected in the same way and the pain in the ankle was sharp. In it he had one day very sharp, stabbing pains down the back of the leg. He describes here, too, the same feelings as if there was a band about the ankle. Patient still experiences this sensation at times. There was no swelling, no special numbness, no enlargement of the joints. It was confined altogether to the legs. It did not incapacitate him in any way, but it was a source of a good deal of annoyance and distress. About two months ago the arms began to be affected. Ill-defined pains from the shoulder, without anything to be seen or localized, but with a good deal of tenderness, particularly of the muscles, when he laid the arm on anything. He does not seem to have had any paraesthesiae. The muscular power of the arms has been perfectly good. The chief distress really has been in soreness on pressure; thus, yesterday there was so much distress in the arms that to get relief he had to sit with them stretched out on pillows. Early in the attack he noticed the presence of certain nodules on the legs and arms which would appear and disappear. Most of these have now gone except the ones which I describe below.

On the skin, one-third from the elbow of the right arm just along the margin of the ulna, there is a small subcutaneous fibroid

nodule, very superficial and very distinct. There have been others which have disappeared. There is no thickening of the ulnar nerve; there are no trophic changes, no trace of sensitiveness in the muscles themselves, though there is much pain when the arm is resting in a certain position. The blood-vessels are not specially thickened. There is no soreness along the musculo-spiral nerve, no actual soreness on pressure on the muscles. On several occasions there has been a little redness. One of these small nodules was on the edge of the left tibia, but has disappeared entirely. There is no atrophy of the muscles in the arms or legs; a little tenderness along some of the cords of the brachial. Knee-jerks are present; perhaps a little plus. Pupils are of medium size, react well to light. No swelling of the joints; no tophi in the ears; he never has had gout.

July 8, 1895.—H has not been so well. Has had much soreness, particularly in the arms and about the left wrist, where there has been subcutaneous redness and swelling. There was also tenderness. There is now on the extensor surface of the left arm midway between the elbow and wrist, a raised red region about 3x2 inches. The redness looks fading, but it is distinctly puffy. It was a patch similar to this, but horizontal, which was on both ankles at the early period of the disease.

The subcutaneous fibroid nodule on the right arm has disappeared. There is one now on the inner surface of the left knee. This feels like a small shotty body beneath the skin. It was a little sensitive. There is another small nodule just on the inner surface of the patella.

The instep is distinctly swollen and red, and it is tender just outside the outer malleolus. There is a little superficial redness also just above the outer malleolus.

After the shooting pains which he had at first on the outer side of the left foot, there was some numbness. It feels a little numb to-day.

This was undoubtedly a case of rheumatic neuritis. Had it not been for the presence of the subcutaneous nodules it would have been almost impossible to say that the condition was rheumatic, owing to the very indefinite nature of the joint symptoms. Their occurrence, however, shows somewhat conclusively that the neuritis was rheumatic in origin.

CASE VIII.—*Subcutaneous fibroid nodules in a case of arthritis deformans.*

Mr. C., æt. —, was admitted to the Johns Hopkins Hospital on September 12, 1895, complaining of enlargement and deformity of the wrist, finger, knee and ankle joints, with pain in these situations.

A satisfactory history could not be obtained from the patient. There had been a history of gout in the family for several generations back.

The patient had his first attack of joint trouble 24 years ago. It commenced in the great toe joint.

The following note was dictated by Professor Osler:

Mucous membranes pale, face flushed, otherwise the patient looks well nourished.

The hands show very characteristic lesions of arthritis deformans.

Right hand: The right wrist is almost completely ankylosed; there is thickening about the bases of the metacarpal bones, and the knuckles are large. The interossei muscles are wasted. There is fair mobility of the metacarpal joints. The fingers have a strong ulnar deflection. There is ankylosis of the 1st and middle metacarpo-phalangeal joints, of the first interphalangeal joint of the index, middle and little fingers, and of the distal joint of the ring and little fingers. No Heberden's nodes.

The fingers are thin, and the skin a little rough and somewhat discolored over the joints. About the knuckles of the middle finger, chiefly on the extensor tendon as it passes over the joint, are 4 or 5 subcutaneous fibroid nodules. One flat yellowish-looking nodule exists on the extensor tendon passing over the knuckle of the ring finger. The extensor muscles of the forearm are a little atrophied.

Left hand: Ankylosis of the wrist much less marked, as also is the ulnar deflection. Ankylosis not so marked in the fingers. In the little finger Heberden's nodes are extremely well developed, and the joints are ankylosed. Nodes are well developed in the index finger. Flat subcutaneous nodules are present on the extensor tendon of the middle finger. Radial thickening on both sides.

The knees are very much enlarged, particularly the right, which is very much rounded; outlines of the patella are lost. Probably some exudation into the bursa. Patella not movable. Much less thickening about left knee; patella movable.

There is very slight flexion in the knees, much more in the left than right.

The ankle joints are uniformly enlarged; very slight mobility; obtuse thickness over the tarsus.

No tophi in the ears.

Heart.—Apex beat neither visible nor palpable. Loud, rough systolic murmur at the apex, transmitted towards the axilla. At the base there is a soft systolic, not loud or rough. Second sound audible and not accentuated.

CASE IX.—*Chronic vegetative endocarditis with subcutaneous fibroid nodules.*

Dr. Osler has kindly given me the full notes of the following interesting case, which was seen in consultation with Dr. J. K. Mitchell, June 7, 1893. Only abstracts from the history will be given.

Martha S., aged 29, a native of Providence, R. I.

When 12 years of age patient had scarlet fever and rheumatism, evidently a severe attack, in which the doctors stated that her heart was affected. She gradually got better, but a year or two subsequently she had a second light attack.

About a year ago she began to have pains in the fingers, and some of the spots to be hereafter described appeared. Last summer she was at her home in Providence not at all well, having occasional attacks of pain in the feet and in the joints, with chilly feelings. About October she began to have more definite fever, preceded by marked chilly sensations, and she has been ill with occasional fever ever since, the temperature rising to 102° to 104°, sometimes with a definite chill. For the past month the temperature range has been from 97° to 101°. The joints, and particularly the ankles at times, have been red, swollen and painful.

To-day the only complaint she has is of pain in the right ankle, which is a little swollen, and just in front of the inner malleolus, reddened. There is no enlargement of the smaller joints.

The apex beat of the heart is forcible, outside the normal position. There is no thrill. On auscultation there is a loud systolic murmur, rough in quality, propagated beyond the axilla. The sounds at the aortic cartilage are clear, and the pulmonary second is very much accentuated.

There is no enlargement of the spleen or liver.

One of the most remarkable features about the case is the appearance of painful spots in and beneath the skin. These are apparently of three different characters: (*a*) reddened, elevated spots in various parts, resembling closely urticaria, and these appear and disappear. There were only two on the skin at the time of my visit; (*b*) local spots of soreness in the skin from two to three lines in diameter, not elevated, usually as Dr. J. K. Mitchell describes them, "pale pink, not elevated, not hard, exquisitely tender, and painful even without being touched"; (*c*) definite firm subcutaneous nodules which have appeared and disappeared, and which are very sensitive to the touch. At the occasion of my visit only one of these was present beneath the skin about the eighth rib on the right side. It felt the size of a small pea, was movable and she winced on the slightest pressure.

The diagnosis was made of a chronic vegetative endocarditis with intermittent fever.

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CASES OF AMŒBIC DYSENTERY.

BY CUNNINGHAM WILSON, M. D., *Birmingham, Alabama.*

The following cases of amœbic dysentery, occurring in my private practice, lack, in careful study, the hospital reports of such cases. Two of them, however (cases 2 and 3), are of more than usual interest on account of finding the amœbæ while examining the patients for other conditions. The first three cases falling into my hands at such short intervals of time led me to believe that this form of dysentery will be found to make up a large proportion of this disease in this climate. During 1894, however, only one case came to my notice, but in some suspicious cases I was unable to use the rectal tube to get the contents of the bowels.

The amœbæ did not differ in any way, as far as I was able to see, from descriptions given by Councilman and Lafleur and from those I saw from a patient in Dr. Osler's clinic at Johns Hopkins Hospital. There were no symptoms of abscess of the liver in any of the cases.

CASE 1. June 1, 1893. I saw for the first time B., white, male, aged forty-nine, married, of very large frame and

extremely emaciated. Has always lived in the South. About two years ago began to have frequent actions from bowels, consisting largely of mucus and blood. This condition has kept up with more or less severity since; at the time of my visit was having from one to twenty stools daily. Microscopic examination of a portion of the stool just passed showed numerous actively moving amœbæ. Frequent examinations of the discharges during the next three weeks always showed the amœbæ. At this time he left the city. His condition with rectal injections, milk diet and other remedies improved very little.

CASE 2. S., white, male, aged 30; locomotive engineer. In 1890 had an attack of dysentery which lasted him two weeks. Since then has had several similar attacks of less severity. August 15, 1893, came to me complaining of internal hemorrhoids, otherwise feeling well. Examination of rectum with speculum revealed two or three small hemorrhoids and higher up two superficial ulcers. Removing the speculum, a quantity of bloody mucus adhered to it. Placing a small portion of this under the microscope, active amœbæ were found. On more careful inquiry it was found that he had been having frequent, small and painless bloody discharges from the bowels which he had taken as symptoms of hemorrhoids. He was advised to use rectal injections of quinine solution. A few days later he was attacked with a violent dysentery which confined him to his bed for three weeks. The amœbæ were abundant in the dysenteric discharges. Ice-water injections with suppositories of iodoform and opium seemed to give him most relief. During the following winter he had another attack, but has remained well since.

CASE 3. W., white, aged twenty-eight, single; telegraph operator. Was born in Ohio; has lived in Alabama three years. His first sickness was a rectal abscess two years ago, which resulted in an anal fistula. During the past year has had several attacks of diarrhœa with considerable cramping in lower bowels. September 3, 1893, came to me to have an operation for cure of fistula. Examination showed a superficial fistula. On removing the speculum there was adhering to it a quantity of blood and mucus similar to what I had seen in Case 2. Microscopic examination showed numerous active amœbæ. Three days later he was attacked with a moderately severe dysentery which kept up for a week. The amœbæ were constantly found during the attack. His strength was considerably reduced and he remained in poor health until October 1, when he took a vacation East and soon regained his health, which has remained good since. Treatment during attack was cold water injections with iodoform and opium suppositories.

CASE 4. F., white, male, Russian. Was seen a few hours before death, September 15, 1894. No history could be obtained. He was having frequent involuntary actions of mucus and blood from bowels. An autopsy was held four hours after death. Nothing of consequence was found in thorax except sclerotic changes in blood-vessels. In the abdomen the entire big gut was prominent, very much thickened and adherent to neighboring structures. The omentum had engrafted itself to the transverse and descending colon, at many points, preventing perforations. The gut was easily torn, tearing by its own weight when lifted. The mucous surface was an area of necrosis, indented with deep ragged ulcers, many of them just ready to break through. Examination of contents of the ulcers showed numerous active amœbæ. Sections of the intestinal wall showed, in a marked degree, the hyaline degeneration described by Councilman and Lafleur (Johns Hopkins Hospital Reports, Vol. II), of muscular fibre as well as of the plastic material thrown around the intestine. Sections of the liver showed advanced cirrhosis. Chronic interstitial changes had taken place in the kidneys.

PROCEEDINGS OF SOCIETIES.

THE JOHNS HOPKINS HOSPITAL MEDICAL SOCIETY.

Meeting of October 7, 1895.

Dr. Simon Flexner was elected President and Dr. J. G. Clark Secretary for the coming year.

Hyperpyrexia in Typhoid Fever.—DR. OSLER.

Among the 389 cases of typhoid fever under treatment in the Hospital during the first six years of its work, there was only one case (fatal) with a temperature of 107°. I do not remember the details of it just now. Within the past few weeks we have had two cases in which the temperature registered 107° and over.

The first case is of some interest in other respects. The man was admitted on September 14th. He had been ill for about two weeks. When admitted he was in a very excited condition, fearful and apprehensive, and exceedingly alarmed about having so protracted a fever. He had characteristic rose spots and slight enlargement of the spleen. The temperature was not high and he had no diarrhœa. For a few days he seemed to be doing very well. The most unpleasant feature of this case was the constant mental apprehension. On the fourth day after admission the temperature reached 104°, and then ranged between 103° and 104° till the seventh day. The sponges reduced his temperature fairly well. I saw him at half-past eleven on the seventh day, and he then seemed to be somewhat better than he had been for a few days. He had been delirious through the night and tried to get out of bed. The abdomen was slightly distended. There was no pain in the right iliac fossa. At half-past eleven the temperature was 104°. At 1 p. m. he had a severe shaking chill. The respirations were hurried; there were loud expiratory groans; the expression was that of fright, and the patient cried out that somebody was trying to kill him. The pupils were widely dilated, but equal; the eyes had a wild, vacant stare. He sweated profusely. The temperature at noon was 104.2°; at 1.45 it was 106.2°. About 1.45 the shaking became less. The patient all this time wss cyanosed; hands purple, lips blue, face dusky. At 1.45 the pulse could hardly be felt. At this time there was a slight twitching of the left side of the face,

but no actual convulsion. The cyanosis became more marked, the patient became weaker, the temperature rose at 2 o'clock to 107.5°—the highest recorded temperature we have had in typhoid fever—and he died at 2.45.

The second case, a colored girl, at present in the Hospital, was admitted about the third week of the fever. She looked very ill, and the nervous symptoms were pronounced. She had excessive jactitation, tremor and delirium. The temperature was 103°, and rose to 104° at 8 p. m. At 2 a. m. it was 102°, and then rose gradually till at 8 a. m. it registered 107.2°. With ice-sponging her temperature was reduced very promptly. She was sponged at eight, ten, twelve and two, and by 2 p. m. her temperature was reduced to 102°, and by 8 p. m to 100°. From that time she did remarkably well.

Abscess of the Liver, perforating the Lung.—Dr Osler.

Of the eighteen or twenty cases of abscess of the liver which have been in the wards, six (including the present) have discharged through the lung. This patient, aged 40, a resident of Birmingham, Ala., was well and strong until June 10th of the present year, when he had an attack of diarrhœa which lasted three weeks. The movements were frequent—four a day; soft, not watery; contained no blood (of this he is sure), and were not accompanied with much pain. There was no swelling of the abdomen. Early in July he became jaundiced and had pain in the right shoulder, and about July 15th pain in the lower ribs. He lost rapidly in weight. About July 20th he began to expectorate large quantities of pus—about a quart in the first two days. A week later the pus began to contain blood. The expectoration of blood and pus has continued to the present time. We saw him on September 12th for the first time; this was nearly two months after the first discharge of pus. When admitted September 12th he had a moderate fever, was pale and sallow-looking, and in a wretched, feeble condition. Now, as you can see, he has improved very greatly. The color is very good, and he has lost entirely the anæmic look which he had upon admission. The physical signs were very indefinite. There was defective expansion over the lower lateral region of the chest. The intercostal spaces were visible, but not quite so grooved as on the other side. There was flatness from about the fourth rib and defective breath sounds. There was no sign of a cavity; no large gurgling râles. His expectoration was very interesting and peculiar. It was of the anchovy-sauce-like character which was referred to by Budd as almost characteristic of the material coming from the liver. On the first day of his admission we found the amœbæ coli. They were never found in large numbers, but they were perfectly distinct and their movements were well marked. They have been present at intervals ever since. The patient has gained about seventeen pounds in weight, the temperature is normal, and he will in all probability get perfectly well.

Discharge of the abscess through the lung is perhaps the most favorable method of spontaneous rupture of liver abscess. Of the six cases in which perforation took place through the lung, three got well. One patient, William Webster, who was shown at this Society meeting on several occasions, was in the house on four or five successive occasions during a period of three years and finally, I believe, has recovered.

Pyarthrosis.—Dr. Finney.

We happen to have in the Hospital just now three cases illustrating a subject which is creating considerable discussion at present in the surgical world—that is, the treatment of pus-joints.

The first case is that of a lad, seventeen years of age, admitted to the Hospital, August 8th, under Dr. Bloodgood's care. Early in June he had a pain in his left knee, which was followed by some swelling and tenderness and slight pain on motion. He was unable to walk with comfort for about a week; after that it gave no further trouble. This was clearly a case of synovitis. Two days before admission to the Hospital, while playing base-ball, he fell and injured the same knee. This was followed by rapid swelling, great pain and tenderness. On admission his temperature was 104°; pulse, 120; face flushed. The left knee was contracted almost to a right angle; it was most comfortable in this position, resting on the outer side. The joint was much swollen, with the patella floating. There was considerable fixation, due to muscular spasm. Some redness about the joint, and it was extremely tender. The joint was first aspirated and a cloudy fluid withdrawn. Later it was incised in the manner about to be described.

This method is the point of especial interest to us. It was suggested by Dr. Halsted because of the uniformly unsatisfactory results of the old method, which was by aspiration, or incision, followed always by the insertion of drainage tubes. The final result of that operation was, in the most favorable cases, a stiff knee. In many there was a resection of the joint later, and in a large proportion of cases an amputation of the leg. The operation done in this case was, after applying a tourniquet to the thigh, to make a long incision into the joint on either side of the patella, through which the joint was irrigated with several gallons of $\frac{1}{1000}$ bichloride solution. Then the tourniquet was removed, the wounds covered with protective and treated in the ordinary way. There is little to be seen now except two parallel granulating wounds. He has been recently anæsthetized and the fibrous adhesions which had formed broken up.

The second case has a very similar history to the first one. He was playing a game of base-ball and was struck by a pitched ball just above and to the outer side of the popliteal space. He did not stop his playing and noticed nothing the matter with the joint until the next morning, when he was waked up by an intense pain in the joint, which was red and swollen. Two days afterward he came into the Hospital with a temperature of 103.5°, rapid pulse; joint very much inflamed and swollen. We aspirated and found a pure culture of streptococcus. The next day we opened the joint in the manner already described, and with one long irrigation the temperature dropped at once, his pain disappeared and has never returned. He has now a granulating wound, as in the other case. He has some motion.

Aspiration in the first case showed that the fluid was full of staphylococci. There was a very marked granular, velvety condition of the synovial membrane. He was irrigated each day for perhaps two weeks before his temperature came down. Then the irrigation was stopped and the wound treated in the ordinary way.

The third case is a still more interesting one. I do not bring him before you because the operation has been done very recently and the patient is a small boy and has been quite sick, so I did not care to disturb him. He was admitted to the ward on Friday, September 25th. On September 20th the patient had some pain in the left knee on walking. There is no history of traumatism of any kind. On the following day the knee was somewhat swollen and the pain more marked. On September 23d the joint was more painful, but the patient was able to be up. On the 24th the patient was unable to walk; knee swollen and painful on the least movement; comfortable while lying still. Fever noticed first at this time. No chills; no sweats. Examination on entrance resulted as follows: Face flushed; anxious countenance; tongue red and dry. No abrasion on any part of body except a small abscess on right hand which he had opened several days before with a needle. Skin over the knee hot and somewhat reddened. Evidence of considerable effusion in the joint. Motion limited and causes pain. Examination of other organs of the body negative. He was aspirated by Dr. Bloodgood. Examination of fluid removed at first, negative. His temperature and pulse still continued high, and on the next morning the joint was opened through a small incision, irrigated thoroughly and then closed. That night his temperature dropped to 101°, but went up the next day. In the meantime, cultures which had been taken developed a mixed infection of staphylococci and streptococci. The next day, his temperature and pulse keeping up, I operated on him in the same way as on the other two. The condition of the synovial membrane was different from that in either of the others; it was covered with a fibrinous exudate, and was pale and smooth, not granular. Two days afterward he began to complain of pain in his elbow and shoulder. These began to swell and fluctuation was observed. Dr. Bloodgood aspirated, but nothing was found. Then cultures were taken from his blood, and of several cultures, staphylococci developed in two. The other tubes were negative, so it is possible that these two may have been contaminated; and it is a question, although they were taken with the greatest care, therefore, whether or not bacteria were present in the blood. We have not opened the other joints, but are simply irrigating the knee. The pain in these joints is diminishing, and to-day for the first time his temperature is normal.

We have had four other cases that I can recall treated in this manner. Of these four, one has had a perfect result. It was a punctured wound of the joint, which was opened and treated in this way. Two cases—one infected with streptococci, the other with staphylococci—healed with limited motion. One case did not return for passive motion, and he is probably responsible for a more or less stiff joint. The fourth was a case of gunshot wound of the joint in which both staphylococci and streptococci were found, and also the gas bacillus. After irrigation this joint was closed. It later came to amputation, because of an extensive invasion of the soft parts of the leg and thigh by the gas bacillus.

DR. WELCH.—Is the joint closed after the irrigation with bichloride?

DR. FINNEY.—It is left open.

DR. WELCH.—This procedure of opening and irrigating pus joints is interesting in reference to the question of disinfecting surfaces of the body. There has been a good deal of experimental work done by Schimmelbusch and others, with the object of ascertaining whether it is possible to disinfect an infected surface or to prevent infection. Doctor Williams has made some observations here with reference to that point in cases of streptococcus infection of the endometrium. He has shown that the micro-organisms are so deep that one cannot possibly think of the disinfectant reaching them. While there appears to be no doubt of the superior efficacy of irrigation with disinfectant solutions, as opposed to simple salt solutions, the grounds for this are not altogether apparent, as experiments show that these disinfectants do not actually kill all of the organisms even on exposed surfaces, and, of course, do not reach those in the depth of the tissues. Of course these remarks relate only to the possible theories or explanations of the process of cure and are not a criticism of the efficacy of the procedure, which is determined only by experience.

I remember the gas bacillus case very well. It interested us extremely because the operation was done within twenty-hours of the injury. The bacillus must have been introduced into the joint by a bullet, and this gives conclusive evidence that this organism is really in the outer world. We have now evidence that it is a widely distributed organism. This is the first conclusive observation, however, of its existence outside of the body.

Specimen of Stomach Removed after Francke's Operation for Gastrostomy.—DR. FINNEY.

I bring this specimen here simply to complete the history of a patient whom I showed to the Society last December. The patient died six and one-half months after the operation, apparently from inanition. While in the Hospital he gained weight and strength. He was fed through the fistula which we made, and at no time was there any leakage through the fistula, which is the test of the operation. The cause of his death was not apparent except that he was very much emaciated. There was little or nothing found in his intestinal canal. It is possible that he was not fed sufficiently. His trouble was a carcinoma of the œsophagus, which was about on a level with the cricoid cartilage. It was a very favorable case because there was no involvement of the glands, except one gland just beside the cancer. It would have been a very favorable case for extirpation.

The specimen is here for your inspection. It shows how the fistula was formed, and shows that the operation was a very satisfactory one.

DR. WELCH.—In the case of death from cancer of the œsophagus, it does not seem to be necessary to assume that it was because the patient was insufficiently fed. Persons die with cancers, particularly of any part of the digestive tract, without extensive metastases, in rather inexplicable ways. The cases sometimes develop a profound anæmia, so that they can be mistaken for pernicious anæmia. Then observations show that in cases of cancer of the œsophagus and stomach there are often atrophic changes in the gastric

glands which interfere with digestive functions. There are other possibilities without assuming that the patient was insufficiently fed.

Schede's Operation for Varicose Veins of the Leg.—Dr. Finney.

Many operations, palliative and radical, have been suggested from time to time for the relief of varicose veins. Palliative measures are good in the less severe cases, but in the more severe cases they are of little service. Of the radical operations, that of Trendelenberg—the ligation of the large saphenous vein below the saphenous opening—is perhaps the best. Extirpation of the veins, after Madelung, and multiple ligation, after Phelps, have been followed by good results. This operation of Schede has the same idea in view—cutting off the column of blood from above—but does it more effectually than any of the other methods. It is simply a circumcision of the entire leg at about the junction of the upper and middle thirds, dividing the skin and subcutaneous tissues down to the deep fascia, tying the bleeding points, and then sewing up the incision. I saw many cases thus treated in Schede's clinic, and was told that excellent results followed, not only the rapid healing of ulcers, but permanent relief from the dilated veins. We have performed the operation in four cases lately. They have all left the Hospital well. I had hoped to have one of them present to-night, but he found it impossible to get here. That case was especially interesting because he had a large ulcer which healed very rapidly after the operation, but which he writes has begun to break down again and cause him trouble since his return to work. Perhaps the operation does not give much more permanent results than the others.

NOTES ON NEW BOOKS.

Helps in Sickness and to Health; When to go and what to do, etc. By Henry C. Burdett. With nineteen illustrations. (*London: The Scientific Press, Limited*, 1894.)

This little book, which is a second edition of two smaller manuals entitled "Helps in Sickness" and "Helps to Health," published some time since by Mr. Burdett, is divided into three parts, the first being Helps to Health; the second, Treatment and Nursing of Emergencies and Simple Ailments, and the third, the list of public institutions and hospitals in England and Wales, being of local rather than general interest. The directions in the first and second parts are in familiar language and are clear and sensible. They cover a wide range of subjects and the suggestions are timely and judicious. The book ought to be in the hands of every family and nurse. Although a portion of the work is intended for England, the book as a whole will be useful throughout the world.

Twenty-fifth Annual Report of the State Board of Health of Massachusetts. (*Boston: Wright & Potter Printing Co., State Printers*, 1894.)

We have had occasion in former years to commend the thoroughness of the annual reports of the Board of Health of Massachusetts. The report under consideration is probably the most valuable of any which has been published, and the methods of work detailed might safely be imitated by the Boards of Health of other States. The excellent work which has been done in supervising the water-supplies of the whole State, and in giving advice as to what ought to be done to improve the quality of the water furnished by the different municipalities, is worth infinitely more to each municipality than the cost of maintaining this Board. If State Boards of Health would do work of this character we should hear fewer complaints of the indifference of taxpayers to sanitation. The examination of water-supplies, which was begun in 1887, has been continued until the present time, and has practically given the Board of Health full knowledge of the potability of all the waters of Massachusetts. In what other State of the Union can this knowledge be said to exist?

No less valuable have been the data collected respecting the filtration of sewage and the continuous efficiency of filters. The conclusions given upon this subject, and upon the filtration of water, should be carefully considered by all who are responsible for the health of cities, both in the matter of water supply and the removal of sewage. The deductions, as to the cremation of sewage, derived from the experiments at the Chicago Exposition, are not as conclusive as one could desire, because of the imperfection of the apparatus employed and the necessarily tentative character of the methods used. A perusal of this report leads one to the irresistible conclusion that the day is not far distant when the water supply of every city must be filtered before it is used, and the sewage of every city must be rendered harmless by cremation or filtration.

The Care of the Baby: A Manual for Mothers and Nurses containing Practical Directions for the Management of Infancy and Childhood in Health and Disease. By J. P. Crozer Griffith, M. D. (*Philadelphia: W. B. Saunders*, 1895.)

This is a capital little book, judiciously planned and clearly written. It gives such details as the mother and nurse should know in simple language. There are explicit directions for dressing, feeding and taking care of the baby; also a chapter on the sick baby, which if carefully read will do much to render the mother watchful, and help her to know when the doctor should be summoned. The book can be safely commended for the use of those for whom it is stated to have been written.

BOOKS RECEIVED.

Transactions of the Medical Society of the State of Pennsylvania at its Forty-fifth Annual Session, held at Chambersburg, 1895. Vol. XXVI. 8vo. 504 pages. 1895. Published by the Society, Philadelphia.

Index Catalogue of the Library of the Surgeon-General's Office, United States Army. Authors and Subjects. Vol. XVI. W-Zythus. 4to. 1895. 822 pages. Government Printing Office, Washington.

Alphabetical List of Abbreviations of Titles of Medical Periodicals employed in the Index-Catalogue of the Library of the Surgeon-General's Office, United States Army, from Volume I to Volume XVI, inclusive. 4to. 1895. 282 pages. Government Printing Office, Washington.

System of Surgery. Edited by Frederic S. Dennis, M. D., assisted by John S. Billings, M. D. Vol. II. Profusely illustrated. 1895. 8vo. 926 pages. Lea Bros. & Co., Phila.

Transactions of the Association of American Physicians. Tenth session, held at Washington, D. C., May 30 and 31, 1895. Vol. X. 8vo. 1895. 406 pages. Printed for the Association, Philadelphia.

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